



05-25-04

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JFW/1754

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Washington, D.C., United States of America

In re Application of HU, X. D.

Serial No.: 09/851,177

Filed: May 8, 2001

For: HIGH SURFACE AREA, SMALL
CRYSTALLITE SIZE CATALYST FOR
FISCHER-TROPSCH SYNTHESIS

REQUEST FOR WITHDRAWAL OF HOLDING OF ABANDONMENT BASED ON
REPLY TIMELY FILED AND RECEIVED IN THE OFFICE BUT NOT CORRELATED
WITH THE APPLICATION PURSUANT TO 37 CFR 1.181

Commissioner for Patents
Group Director 1754
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

We kindly request the United States Patent Office to reinstate patent application 09/851,177 in accordance with 37 CFR § 1.181 based on the following facts:

1. We responded to the March 26, 2003 (3/26/03) office action by fax on September 24, 2003 (Exhibit A).
2. Included was a Petition for Extension of Time Under 37 CFR 1.136(a) for three months with payment by credit card of \$930.00 (Exhibit B).
3. We received the Auto-Reply Facsimile Transmission Report on September 24, 2003 with time as 8:36:34 AM (EDT) (Exhibit C).
4. We received a Notice of Abandonment on November 18, 2003 (Exhibit D).
5. On November 26, 2003 in accordance with 37 CFR 1.8 (b), we informed the

USPTO we previously transmitted by fax a response to the office action with mailing date of 03/26/03 (Exhibit E).

6. Since that time we have contacted the Inventor's Assistance Center on numerous occasions that informed us in December and January the application was still abandoned. February, March and April it was stated by the Assistance Center that the application was with the Group Art Unit 1754. We left numerous messages with Stan Silverman who is the head of Group 1700. In May, we were told by the Center they could not tell from the information on the computer exactly where this application was located.

Having satisfied all requirements, applicants respectfully request that this Petition be granted and the holding of abandonment of the application be withdrawn.

Further the applicant respectfully request that the USPTO treat the Response to the March 26, 2003 Office Action as timely filed.

Respectfully submitted,



Joan Simunic, Reg. No. 43,125
Süd-Chemie Inc.
(502) 634-7373
jsimunic@sud-chemieinc.com

Date: 5/20/04



ER 521694377 US

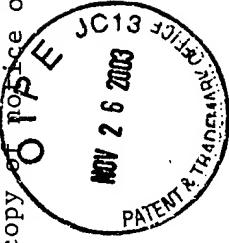
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PC/ZIP Code 40210	Day of Delivery <input checked="" type="checkbox"/> Next <input type="checkbox"/> Second	Postage \$ 13.65	Delivery Attempt Mo. Day Mo. Day Mo. Day Mo. Day	Time <input type="checkbox"/> AM <input type="checkbox"/> PM <input type="checkbox"/> AM <input type="checkbox"/> PM	Employee Signature
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□ Weekend □ Holiday					
FROM: (PLEASE PRINT)		PHONE 502 634-7200	NO DELIVERY □ Weekend □ Holiday		
TO: (PLEASE PRINT) PHONE (703) 908-5068					
<p>Director of Technology Center Group Art Unit 1754 Mail Stop Non-Fee P.O. Box 1450 Alexandria, VA 22313-1450</p> <p>FOR PICKUP OR TRACKING CALL 1-800-222-1811</p> <p>www.usps.com</p> <p>PRESS HARD. You are making 3 copies.</p>					

DEC 12 2009

The USPTO date stamp acknowledges receipt of the paper(s) listed

Applicant: Sud-Chemie Inc.
 Patent/Application No.: 09/851,177
 Filing Date: May 8, 2001
 Title: HIGH SURFACE AREA, SMALL CRYSTALLITE SIZE CATALYST
 FOR FISCHER-TROPSCH SYNTHESIS
 Payment: N/A
 Attachments: Cover letter; copy of response to office action;
 copy of auto reply facsimile transmission; copy of Office of
 Patent & Trademark
 USPS Express Mail #: ER 521694377 US

Response to notice of abandonment





Süd-Chemie Inc.
1600 West Hill Street
Louisville, Kentucky 40210

PHONE: (502) 634-7373
FAX: (502) 634-7724

CONFIDENTIAL AND PRIVILEGED
ATTORNEY CLIENT COMMUNICATION

The information contained in this facsimile message is the property of Süd-Chemie Inc. If you are not the intended recipient of this information, any disclosure, copying, distribution, or the taking of any action in reliance on this information, is strictly prohibited. If you have received this message in error, please notify us immediately to arrange for its return. Thank you.

TO: U.S. Patent and Trademark Office
Examiner: Cam Nguyen Group: 1754
Fax #703-872-9306

FROM: Joan L. Simunic Reg. No. 43,125
DATE: September 24, 2003
PAGES: 20 in total (including cover sheet)
RE: U.S. Patent Application No. 09/851,177

Remarks: This facsimile is in response to the office action, having a mailing date of March 26, 2003

Enclosed are:

- (1) Transmittal Form.
- (2) Fee Transmittal for FY 2003
- (3) Credit Card Payment Form
- (4) Petition for Extension of Time
- (5) Response to Office Action
- (6) Clean Unmarked Version of Claims Now in Application

CERTIFICATE OF FACSIMILE TRANSMISSION UNDER 37 CFR 1.8

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Donna Ferrill
Person Signing

Signature

9/24/03
Date



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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

		Application Number	09/851,177
		Filing Date	May 8, 2001
		First Named Inventor	X. D. Hu
		Art Unit	1754
		Examiner Name	Cam Nguyen
Total Number of Pages in This Submission	20	Attorney Docket Number	ZL 494/01001

ENCLOSURES (Check all that apply)			
<input checked="" type="checkbox"/> Fee Transmittal Form <input checked="" type="checkbox"/> Fee Attached <input checked="" type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input checked="" type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/ Incomplete Application <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation <input type="checkbox"/> Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____	<input type="checkbox"/> After Allowance communication to Technology Center (TC) <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): <input type="checkbox"/> Postcard	Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Joan L. Simunic, Reg. 43,125
Signature	
Date	September 23, 2001

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Typed or printed name	Dinna Form II	
Signature		Date
	September 24, 2001	

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



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FEET TRANSMITTAL for FY 2003		Complete if Known	
<i>Effective 01/01/2003. Patent fees are subject to annual revision.</i>		Application Number 09/851,177 Filing Date May 8, 2001 First Named Inventor X. D. Hu Examiner Name Cam Nguyen Art Unit 1754 Attorney Docket No. ZL 494/01001	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27		TOTAL AMOUNT OF PAYMENT (\$ 930.00)	

METHOD OF PAYMENT (check all that apply)		FEE CALCULATION (continued)																																																																																																																									
<input type="checkbox"/> Check <input checked="" type="checkbox"/> Credit card <input type="checkbox"/> Money Order <input type="checkbox"/> Other <input type="checkbox"/> None <input type="checkbox"/> Deposit Account: Deposit Account Number Deposit Account Name		3. ADDITIONAL FEES																																																																																																																									
The Director is authorized to: (check all that apply) <input type="checkbox"/> Charge fee(s) indicated below <input type="checkbox"/> Credit any overpayments <input type="checkbox"/> Charge any additional fee(s) during the pendency of this application <input type="checkbox"/> Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Large Entity</th> <th>Small Entity</th> <th>Fee Description</th> <th>Fee Paid</th> </tr> </thead> <tbody> <tr><td>Fee Code (\$)</td><td>Fee Code (\$)</td><td>Fee Code (\$)</td><td>Fee Code (\$)</td></tr> <tr><td>1051 130</td><td>2051 65</td><td>Surcharge - late filing fee or oath</td><td>-</td></tr> <tr><td>1052 50</td><td>2052 25</td><td>Surcharge - late provisional filing fee or cover sheet</td><td>-</td></tr> <tr><td>1053 130</td><td>1053 130</td><td>Non-English specification</td><td>-</td></tr> <tr><td>1812 2,520</td><td>1812 2,520</td><td>For filing a request for ex parte reexamination</td><td>-</td></tr> <tr><td>1804 920*</td><td>1804 920*</td><td>Requesting publication of SIR prior to Examiner action</td><td>-</td></tr> <tr><td>1805 1,840*</td><td>1805 1,840*</td><td>Requesting publication of SIR after Examiner action</td><td>-</td></tr> <tr><td>1251 110</td><td>2251 55</td><td>Extension for reply within first month</td><td>-</td></tr> <tr><td>1252 410</td><td>2252 205</td><td>Extension for reply within second month</td><td>930</td></tr> <tr><td>1253 930</td><td>2253 465</td><td>Extension for reply within third month</td><td>-</td></tr> <tr><td>1254 1,450</td><td>2254 725</td><td>Extension for reply within fourth month</td><td>-</td></tr> <tr><td>1255 1,970</td><td>2255 985</td><td>Extension for reply within fifth month</td><td>-</td></tr> <tr><td>1401 320</td><td>2401 160</td><td>Notice of Appeal</td><td>-</td></tr> <tr><td>1402 320</td><td>2402 160</td><td>Filing a brief in support of an appeal</td><td>-</td></tr> <tr><td>1403 280</td><td>2403 140</td><td>Request for oral hearing</td><td>-</td></tr> <tr><td>1451 1,510</td><td>1451 1,510</td><td>Petition to institute a public use proceeding</td><td>-</td></tr> <tr><td>1452 110</td><td>2452 55</td><td>Petition to revive - unavoidable</td><td>-</td></tr> <tr><td>1453 1,300</td><td>2453 650</td><td>Petition to revive - unintentional</td><td>-</td></tr> <tr><td>1501 1,300</td><td>2501 650</td><td>Utility issue fee (or reissue)</td><td>-</td></tr> <tr><td>1502 470</td><td>2502 235</td><td>Design issue fee</td><td>-</td></tr> <tr><td>1503 630</td><td>2503 315</td><td>Plant issue fee</td><td>-</td></tr> <tr><td>1460 130</td><td>1460 130</td><td>Petitions to the Commissioner</td><td>-</td></tr> <tr><td>1807 50</td><td>1807 50</td><td>Processing fee under 37 CFR 1.17(q)</td><td>-</td></tr> <tr><td>1806 180</td><td>1806 180</td><td>Submission of Information Disclosure Stmt</td><td>-</td></tr> <tr><td>8021 40</td><td>8021 40</td><td>Recording each patent assignment per property (times number of properties)</td><td>-</td></tr> <tr><td>1809 750</td><td>2809 375</td><td>Filing a submission after final rejection (37 CFR 1.129(a))</td><td>-</td></tr> <tr><td>1810 750</td><td>2810 375</td><td>For each additional invention to be examined (37 CFR 1.129(b))</td><td>-</td></tr> <tr><td>1801 750</td><td>2801 375</td><td>Request for Continued Examination (RCE)</td><td>-</td></tr> <tr><td>1802 900</td><td>1802 900</td><td>Request for expedited examination of a design application</td><td>-</td></tr> </tbody> </table>		Large Entity	Small Entity	Fee Description	Fee Paid	Fee Code (\$)	Fee Code (\$)	Fee Code (\$)	Fee Code (\$)	1051 130	2051 65	Surcharge - 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SUBMITTED BY				Subtotal (3) (\$) 930																																																																																																																							
Name (Print/Type) Jean L. Simunic Signature		Registration No. 43,125 (Attorney/Agent)		Telephone 502-634-7373 Date September 23, 2003																																																																																																																							

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) <u>2L494/01001</u>
	In re Application of <u>X. D. Hu et al</u>	
	Application Number <u>09/851,177</u>	Filed <u>May 8, 2001</u>
	For <u>High Surface Area,...</u>	
	Art Unit <u>1754</u>	Examiner <u>C. Nguyen</u>

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

<input type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$ _____
<input type="checkbox"/> Two months (37 CFR 1.17(a)(2))	\$ _____
<input checked="" type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$ <u>930</u>
<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$ _____
<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$ _____
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: \$ _____.	
<input type="checkbox"/> A check in the amount of the fee is enclosed.	
<input checked="" type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.	
<input type="checkbox"/> The Director has already been authorized to charge fees in this application to a Deposit Account.	
<input type="checkbox"/> The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.	

I have enclosed a duplicate copy of this sheet.

I am the applicant/inventor.

<input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).
<input checked="" type="checkbox"/> attorney or agent of record. Registration Number <u>43,125</u>
<input type="checkbox"/> attorney or agent under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) _____.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

September 23, 2003
Date

502-634-7373
Telephone Number

Signature
Joan L. Simonc
Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) <u>72494/01001</u>
In re Application of <u>X. D. Hu et al</u>		
Application Number <u>09/851,177</u>		Filed <u>May 8, 2001</u>
For <u>High Surface Area...</u>		
Art Unit <u>1754</u>	Examiner <u>C. Nguyen</u>	

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

<input type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$ _____
<input type="checkbox"/> Two months (37 CFR 1.17(a)(2))	\$ _____
<input checked="" type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$ <u>930</u>
<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$ _____
<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$ _____
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: \$ _____.	
<input type="checkbox"/> A check in the amount of the fee is enclosed.	
<input checked="" type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.	
<input type="checkbox"/> The Director has already been authorized to charge fees in this application to a Deposit Account.	
<input type="checkbox"/> The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.	

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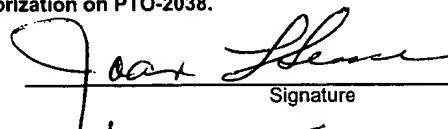
I am the applicant/inventor.

<input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).
<input checked="" type="checkbox"/> attorney or agent of record. Registration Number <u>43,125</u>
<input type="checkbox"/> attorney or agent under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) _____.

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September 23, 2003
Date

502-634-7373
Telephone Number


Signature

Joan L. Simonic
Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application Number : 09/851,177
Applicants : X. D. Hu et al.
Filing Date : 05/08/2001
TC/A.U. : 1754
Examiner : Cam Nguyen

Attorney Docket No. : ZL494/01001
Customer No. :
Title: High Surface Area, Small Crystallite Size Catalyst for Fischer-Tropsch Synthesis

Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

ADMENDMENT

Sir:

In response to the Office Action mailed March 26, 2003, please amend the above-identified application as follows:

Amendments to the Specification: There are no changes are being made to the specification.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Amendments to the Drawings: There are no changes are being made to the drawings.

Remarks/Arguments begin on page 6 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1. (currently amended) A catalyst for use in the Fischer-Tropsch process, said catalyst comprising a catalyst particle, which comprises at least one metal that is an efficient carbon monoxide adsorber and at least one promoter, said metal and said promoter being dispersed on a support to form a said catalyst particle, said particle having a BET surface area of from about 100 m²/g to about 250 m²/g, and said metal and said promoter being dispersed on the support such that the crystallite size of the metal oxide is from about 40 Å to about 200 Å, and said particle having an essentially smooth, homogeneous surface morphology.

Claim 2. (original) The catalyst of Claim 1 wherein said particle comprises from about 5 wt % to about 60 wt % cobalt, and from about 0.0001 wt % to about 1 wt % of a first promoter, and from about 0.01 wt % to about 5 wt % of a second promoter.

Claim 3. (original) The catalyst of Claim 2 wherein said particle comprises from about 10 wt% to about 30 wt % cobalt, and from about 0.01 wt % to about 0.05 wt % of said first promoter, and from about 0.1 wt % to about 1 wt % of said second promoter.

Claim 4. (original) The catalyst of Claim 1 wherein said metal is selected from the group consisting of nickel, cobalt, iron, ruthenium, osmium, platinum, palladium, iridium, rhenium, molybdenum, chromium, tungsten, vanadium, rhodium, copper, zinc, and combinations thereof.

Claim 5. (original) The catalyst of Claim 4 wherein said metal is cobalt.

Claim 6. (currently amended) The catalyst of Claim 1 wherein said promoter is selected from the group consisting of boron, cerium, chromium, copper, iridium, iron, lanthanum, manganese, molybdenum, palladium, platinum, rhenium, rhodium, ruthenium, strontium, tungsten, vanadium, zinc, sodium oxide, potassium oxide, rubidium oxide, cesium oxide, magnesium oxide, titanium oxide, zirconium oxide, and other rare earth metals, such as scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, other rare earth metals and combinations thereof.

Claim 7. (original) The catalyst of Claim 2 wherein said first promoter is selected from the group consisting of palladium, platinum, ruthenium, rhenium, rhodium, iridium and a combination thereof; and said second promoter is selected from the group consisting of potassium, boron, cesium, lanthanum, cerium, strontium, scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, palladium, platinum, ruthenium, rhenium, rhodium, iridium and combinations thereof.

Claim 8. (original) The catalyst of Claim 1 wherein said support is selected from the group consisting of aluminum oxide, γ -alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, γ -zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 9. (original) The catalyst of Claim 8 wherein said support is γ -alumina.

Claim 10. (original) The catalyst of Claim 9 wherein said support has a particle size of from about 60 μm to about 150 μm , a surface area of from about 90 m^2/g to about 210 m^2/g , a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 11. (currently amended) A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size, and wherein said particle being is formed by the steps of:

- a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;
- b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;
- c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is essentially completely reacted with said support;
- d) separating said slurry into a solid portion and a liquor portion;
- e) washing said solid portion with water;
- f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles; and
- g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours.

Claim 12. (original) The catalyst of Claim 11 wherein said support is selected from the group consisting of aluminum oxide, γ -alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, γ -zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 13. (original) The catalyst of Claim 12 wherein said support is aluminum oxide.

Claim 14. (original) The catalyst of Claim 12 wherein said support has a particle size of from about 60 μm to about 150 μm , a surface area of from about 90 m^2/g to about 210 m^2/g , a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 15. (original) The catalyst of Claim 11 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitilo tetraacetic acid, and combinations thereof.

Claim 16. (currently amended) The catalyst of Claim 15 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water ~~molecules~~, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 17. (original) The catalyst of Claim 16 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate.

Claim 18. (original) The catalyst of Claim 11 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 19. (original) The catalyst of Claim 11 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 20. (original) The catalyst of Claim 11 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 21. (original) The catalyst of Claim 11 wherein said particles are further stabilized to prevent pyrophoric reactions when said particles are in the presence of air.

Claim 22. (currently amended) The catalyst of Claim 21 wherein said particles are stabilized by ~~being coated~~ coating with oil.

Claim 23. (currently amended) The catalyst of Claim 11 further including at least one promoter, wherein said promoter being is added with said cobalt salt solution.

Claim 24. (original) The catalyst of Claim 23 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 25. (original) The catalyst of Claim 11 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claims 26 – 34. (canceled)

26. — A method for making a catalyst for use in the Fischer Tropseh process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle, said method comprising:
a) — adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;
b) — adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;
c) — agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is essentially completely reacted with said support;
d) — separating said slurry into a solid portion and a liquor portion;
e) — washing said solid portion with water;
f) — drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles; and
g) — reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours.

27. — The catalyst of Claim 26 wherein said support is aluminum oxide.

28. — The catalyst of Claim 27 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate.

29. ~~The catalyst of Claim 26 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step e).~~

30. ~~The catalyst of Claim 26 wherein said solid portion is dried at from about 120°C to about 260°C in step f).~~

31. ~~The catalyst of Claim 26 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.~~

32. ~~The catalyst of Claim 26 wherein said particles are further stabilized by being coated with oil.~~

33. ~~The catalyst of Claim 26 further including at least one promoter, said promoter being added with said cobalt salt solution.~~

34. ~~The catalyst of Claim 33 wherein said promoter is a metal salt selected from the group consisting of rhodium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.~~

Claim 35. (new) A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle, wherein said particle is formed by the steps of:

- a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;
- b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;
- c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is reacted with said support;
- d) separating said slurry into a solid portion and a liquor portion;
- e) washing said solid portion with water;
- f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles;
- g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours; and
- h) stabilizing said particles to prevent pyrophoric reactions when said particles are in the presence of air by coating said particles with oil.

Claim 36. (new) The catalyst of Claim 35 wherein said support is selected from the group consisting of aluminum oxide, γ -alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, γ -zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 37. (new) The catalyst of Claim 36 wherein said support has a particle size of from about 60 μm to about 150 μm , a surface area of from about 90 m^2/g to about 210 m^2/g , a pore volume of from about 0.35 ml/g to about 0.50 ml/g , and a pore diameter of from about 8 nm to about 20 nm.

Claim 38. (new) The catalyst of Claim 35 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitilo tetraacetic acid, and combinations thereof.

Claim 39. (new) The catalyst of Claim 38 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 40. (new) The catalyst of Claim 35 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 41. (new) The catalyst of Claim 35 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 42. (new) The catalyst of Claim 35 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 43. (new) The catalyst of Claim 35 further including at least one promoter wherein said promoter is added with said cobalt salt solution.

Claim 44. (new) The catalyst of Claim 43 wherein said promoter is a metal salt selected from the group consisting of rhodium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 45. (new) The catalyst of Claim 35 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claim 46. (new) The catalyst of Claim 35 wherein said support is aluminum oxide and said aqueous cobalt salt solution comprises water and hexaammine cobalt (II) carbonate.

Attachment: Clean Unmarked Version of Claims Now in Application

REMARKS / ARGUMENTS

Remarks Regarding Informalities and Claims Rejected Under 35 USC §112

Claims 1 – 25 remain in the application. Claims 35 – 46 have been added to the application and are presented for examination. Claims 26 – 34 have been withdrawn in response to a requirement by the Examiner that the claims be restricted to Claims 1 – 25, drawn to a catalyst, or to Claims 26 – 34, drawn to a process of preparing a catalyst. In view of the Examiner’s earlier restriction requirement, applicant retains the right to present claims 26 – 34 in a divisional application.

The Examiner objected to claims 1, 11, 16, 22, and 23 because of noted informalities. As proposed by the Examiner, claims 1 and 11 have been reworded in lines 1 – 3. Further, as proposed by the Examiner: in claim 1, line 5, “being” has been replaced with “are”; in claim 11, line 2, “being” has been replaced with “is”; and, in claim 16, line 2, “molecules” has been deleted to retain consistency with the language of claim 15. Further formality amendments include: in claim 22, line 1, “being coated” has been deleted and replaced with “coating”; and in claim 23, line 2, “being” has been replaced with “is” and “wherein” has been added. The amendments of claim 22 and claim 23 were suggested by the Examiner but required further correction than proposed to have grammatically correct sentences after amendment. Finally, in claim 11, step (c), “essentially completely” has been deleted to address a concern raised by the Examiner with the original language. No new subject matter has been added in making these amendments.

The Examiner objected to claim 17 based on the failure to comply to 37 CFR 1.75(c). The applicant respectfully challenges this objection. Claim 17 depends from claim 16 which recites a cobalt (II) complex having “coordination sphere ligands selected from the group consisting of water, ammonia, ...” Claim 17 recites “The catalyst of Claim 16 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate.” As is known in the art, the “hexaammine cobalt (II) carbonate” coordination sphere ligands are ammonia, as recited in claim 16. The carbonate is not a coordination sphere ligand but rather a counterion to the positively charged cobalt ion. Thus, applicant requests the Examiner to reconsider his objection with respect to claim 17.

Claims 1 – 10 and 16 – 17 were rejected under 35 U.S.C. §112. The Examiner states that Claim 1 recites the limitation “the metal oxide” with insufficient antecedent basis for this limitation. The applicant respectfully notes that in the specification on page 4, lines 2 – 3, the catalyst has “a metal oxide crystallite size of from about 40 Å to about 200 Å.” On page 12, lines 11 – 15, the metal oxide is more narrowly defined as the “cobalt oxide crystallite size” – and as is known in the art, cobalt is considered a metal when in reference to oxides – and the “cobalt oxide crystallite size ... is greater than about 40 Å diameter, and is preferably less than about 200 Å.” Thus, applicant requests the Examiner to reconsider his objection under 35 U.S.C. §112 with respect to claim 1, and its dependent claims 2 – 10. If it would expedite matters, the applicant is willing to amend the paragraph on page 12 to include the more inclusive language of page 4 if so requested by the Examiner.

As noted by the Examiner, Claim 6 included the indefinite phrase “such as”. Claim 6 has been amended to delete this phrase and should now be in allowable form.

As noted by the Examiner, Claim 16 included improper Markush terminology. Claim 16 has been amended to be consistent with the correct Markush phrase, and claim 16 and its dependent claim 17 should now be in allowable form.

Remarks Regarding Allowable Subject Matter

The Examiner has indicated that Claim 22 is objected to as being dependent on a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In response to this rejection, new claim 35 is presented. New claim 35 includes the limitations of rejected independent claims 11 (preamble and steps a – g), rejected dependent claim 21 and objected to dependent claim 22 (step h). Claims 36 – 46 have been added as claims dependent on new independent claim 35. As amended, independent claim 35 is believed to now be in allowable form. Because they depend from an allowable claim, dependent claims 36 – 46 are also believed to now be in allowable form.

The Examiner has also indicated that claims 1 – 10 would be allowable if the 35 U.S.C. §112 rejection is overcome. As noted in the prior section, page 4, lines 2 – 3, of the specification teach a catalyst that has “a metal oxide crystallite size of from about 40 Å to about 200 Å” and page 12, lines 11 – 15, of the specification teach “cobalt oxide crystallite size ... greater than about 40 Å diameter, and is preferably less than about 200 Å.” Applicant is willing to amend the paragraph on page 12 to include the more inclusive language of page 4 if so requested by the Examiner.

Remarks Regarding Citations

Applicant has made note of the prior art recited by the Examiner in Paragraph 15 of his Office Action mailed March 26, 2003.

Remarks Regarding Claims Rejected Under 35 USC §102(b) and 35 USC §103(a)

The Examiner has rejected independent claim 11 and dependent claims 12, 14 – 21, 23 and 25 under 35 U.S.C 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Shen et al, U.S. Patent 5,962,367 (“the ‘367 patent”). Applicant respectfully traverses both rejections.

The Examiner has further rejected independent claim 11 and dependent Claims 12 – 13, 15 – 21 and 23 – 25 under 35 U.S.C 102(b) as anticipated by or in the alternative, under 35 U.S.C. 103(a) as obvious over Sapienza et al., U.S. Patent 4,396,539 (“the ‘539 patent”). Applicant respectfully traverses both rejections.

Summary of the Present Invention

The Fischer-Tropsch catalyst of the present invention is a transition metal-based catalyst having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support, and a small metal oxide crystallite size. In a first embodiment, the catalyst has a surface area of from about 100 m²/g to about 250 m²/g; an essentially smooth, homogeneous surface morphology; an essentially uniform distribution of metal throughout an essentially inert support; and a metal oxide crystallite size of from about 40 Å to about 200 Å. Optionally, the catalyst may further comprise at least one promoter.

The Fischer-Tropsch catalyst of independent claim 11 of the present application, as amended, is a catalyst comprising cobalt dispersed on a support to form a catalyst particle having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size, and wherein the particle is formed by several prescribed steps. Claims 12 – 25 of the present application depend from independent claim 11.

As provided in dependent claim 14, the catalyst of claim 11 may be prepared from a support having a particle size of from about 60 µm to about 150 µm, a surface area of from about 90 m²/g to about 210 m²/g, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm. However, as discussed on page 28, line 1 through page 29, line 4 and as shown in Figures 1A – 4, two catalysts prepared with the same support material can have significantly different physical characteristics depending upon the process used to make the catalyst. (N.B.: In the examples of the present application each catalyst was prepared using a Puralox SCCa 5/150 support having a surface area of about 160 m²/g, a pore volume of about 0.50 ml/g, and a pore diameter of about 12.55 nm.) The steps outlined in independent claim 11 result in a catalyst particle having the desired physical characteristics. Prior art methods of catalyst particle preparation, even starting with the same support, do not result in the catalyst particle of the present invention.

Summary of U.S. Patent 5,962,367, Shen et al.

U.S. Patent 5,962,367 teaches a process for preparing a catalyst support primarily formed of titania. The catalyst support comprises 60 wt% to 100 wt % titania as TiO₂ and 0 wt% to 40 wt % alumina as Al₂O₃. As noted by the Examiner, the ‘367 patent teaches a cobalt molybdate catalyst supported on a titania support, wherein the support has a surface area ranging from 80 m²/g to 200 m²/g, a pore volume of from about 0.3 ml/g to about 0.5 ml/g, and a pore diameter of from about 6 nm to about 20 nm.

The ‘367 patent then teaches using this catalyst support to prepare a cobalt molybdate catalyst using an impregnation process. At column 5, lines 6 – 8, the ‘367 states “the dynamic co-impregnation

method is used for supporting the cobalt and molybdenum active components ..." In Examples 4 - 7, the support is "immersed into the impregnating solution ..." for the preparation of the catalyst.

However, the '367 patent does not teach or suggest that the catalyst resulting from the impregnation process using the '367 titania support has a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size as is seen with the preparation process of the present invention. Rather, there is nothing in the '367 patent that suggests that the physical characteristics of the cobalt molybdate catalyst prepared by the impregnation process would be any different than the catalysts prepared by the prior art impregnation method and reported in Example 6 (and Figures 2A, 2B and 4) of the present application. Further, the catalyst of the present invention made by the process of instant claim 11 would not be anticipated or obvious merely because a titania support is used, or the physical characteristics of the support are similar to supports of the prior art, or because a promoter is added. Thus, independent claim 11 and its dependent claims 12 - 25 are not anticipated nor obvious in view of U.S. Patent 5,962,367.

Summary of U.S. Patent 4,396,539, Sapienza et al.

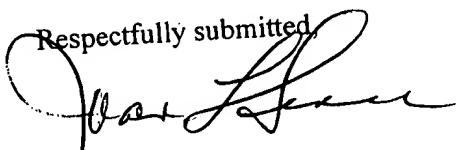
U.S. Patent 4,396,539 teaches a process for preparing a catalyst suitable for Fischer-Tropsch synthesis wherein the catalyst is composed of palladium or platinum and cobalt supported on a solid support. More specifically, the '539 patent teaches an alumina, silica gel, kieselguhr, or zinc oxide support that is impregnated by immersion of the support in an aqueous solution of the salt of a palladium or platinum metal. The palladium- or platinum-treated support is then immersed in a solution containing primarily cobalt.

The objective of the process set forth in the '539 patent is to achieve a catalyst particle with the metal loading as a coating around the support. The catalyst structure depicted in Figure 5 is believed to "best represent the idealized structure of this catalyst" (column 4, lines 9 - 21). By contrast, the process of claim 11 of the present invention produces a catalyst that has "an essentially uniform distribution of cobalt throughout the support". In other words, the process taught in the '539 patent teaches away from the desired product of the present invention. Thus, independent claim 11 and its dependent claims 12 - 25 are not anticipated nor obvious in view of U.S. Patent 4,396,539.

Because U.S. Patent 5,962,367 and U.S. Patent 4,396,539 each teach a process for preparing a catalyst that relies on impregnation to deliver the metal to the support, the product-by-process taught by the amended claim 11 of the present application is neither anticipated nor obvious. Thus, applicant respectfully requests that the §102(b) and the §103(a) rejections be withdrawn and that independent claim 11, as amended, and its dependent claims 12 - 25, be allowed.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,



Joan L. Simunic
Reg. 43,125
Tel: (502) 634-7373
Fax: (502) 634-7724

Clean Unmarked Version of Claims Now in Application

Claim 1. A catalyst for use in the Fischer-Tropsch process, said catalyst comprising a catalyst particle, which comprises at least one metal that is an efficient carbon monoxide adsorber and at least one promoter dispersed on a support to form said catalyst particle, said particle having a BET surface area of from about 100 m²/g to about 250 m²/g, and said metal and said promoter are dispersed on the support such that the crystallite size of the metal oxide is from about 40 Å to about 200 Å, and said particle having an essentially smooth, homogeneous surface morphology.

Claim 2. The catalyst of Claim 1 wherein said particle comprises from about 5 wt % to about 60 wt % cobalt, and from about 0.0001 wt % to about 1 wt % of a first promoter, and from about 0.01 wt % to about 5 wt % of a second promoter.

Claim 3. The catalyst of Claim 2 wherein said particle comprises from about 10 wt% to about 30 wt % cobalt, and from about 0.01 wt % to about 0.05 wt % of said first promoter, and from about 0.1 wt % to about 1 wt % of said second promoter.

Claim 4. The catalyst of Claim 1 wherein said metal is selected from the group consisting of nickel, cobalt, iron, ruthenium, osmium, platinum, palladium, iridium, rhenium, molybdenum, chromium, tungsten, vanadium, rhodium, copper, zinc, and combinations thereof.

Claim 5. The catalyst of Claim 4 wherein said metal is cobalt.

Claim 6. The catalyst of Claim 1 wherein said promoter is selected from the group consisting of boron, cerium, chromium, copper, iridium, iron, lanthanum, manganese, molybdenum, palladium, platinum, rhenium, rhodium, ruthenium, strontium, tungsten, vanadium, zinc, sodium oxide, potassium oxide, rubidium oxide, cesium oxide, magnesium oxide, titanium oxide, zirconium oxide, scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, other rare earth metals and combinations thereof.

Claim 7. The catalyst of Claim 2 wherein said first promoter is selected from the group consisting of palladium, platinum, ruthenium, rhenium, rhodium, iridium and a combination thereof; and said second promoter is selected from the group consisting of potassium, boron, cesium, lanthanum, cerium, strontium, scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, palladium, platinum, ruthenium, rhenium, rhodium, iridium and combinations thereof.

Claim 8. The catalyst of Claim 1 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 9. The catalyst of Claim 8 wherein said support is γ-alumina.

Claim 10. The catalyst of Claim 9 wherein said support has a particle size of from about 60 µm to about 150 µm, a surface area of from about 90 m²/g to about 210 m²/g, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 11. A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size, and wherein said particle is formed by the steps of:

- a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;
- b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;
- c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is reacted with said support;
- d) separating said slurry into a solid portion and a liquor portion;
- e) washing said solid portion with water;
- f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles; and
- g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours.

Claim 12. The catalyst of Claim 11 wherein said support is selected from the group consisting of aluminum oxide, γ -alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, γ -zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 13. The catalyst of Claim 12 wherein said support is aluminum oxide.

Claim 14. The catalyst of Claim 12 wherein said support has a particle size of from about 60 μm to about 150 μm , a surface area of from about 90 m^2/g to about 210 m^2/g , a pore volume of from about 0.35 ml/g to about 0.50 ml/g , and a pore diameter of from about 8 nm to about 20 nm.

Claim 15. The catalyst of Claim 11 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitrilo tetraacetic acid, and combinations thereof.

Claim 16. The catalyst of Claim 15 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 17. The catalyst of Claim 16 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate.

Claim 18. The catalyst of Claim 11 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 19. The catalyst of Claim 11 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 20. The catalyst of Claim 11 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 21. The catalyst of Claim 11 wherein said particles are further stabilized to prevent pyrophoric reactions when said particles are in the presence of air.

Claim 22. The catalyst of Claim 21 wherein said particles are stabilized by coating with oil.

Claim 23. The catalyst of Claim 11 further including at least one promoter wherein said promoter is added with said cobalt salt solution.

Claim 24. The catalyst of Claim 23 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 25. The catalyst of Claim 11 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claim 35. A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle, wherein said particle is formed by the steps of:

- a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;
- b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;
- c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is reacted with said support;
- d) separating said slurry into a solid portion and a liquor portion;
- e) washing said solid portion with water;
- f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles;
- g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours; and
- h) stabilizing said particles to prevent pyrophoric reactions when said particles are in the presence of air by coating said particles with oil.

Claim 36. The catalyst of Claim 35 wherein said support is selected from the group consisting of aluminum oxide, γ -alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, γ -zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 37. The catalyst of Claim 36 wherein said support has a particle size of from about 60 μm to about 150 μm , a surface area of from about 90 m^2/g to about 210 m^2/g , a pore volume of from about 0.35 mL/g to about 0.50 mL/g , and a pore diameter of from about 8 nm to about 20 nm.

Claim 38. The catalyst of Claim 35 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitilo tetraacetic acid, and combinations thereof.

Claim 39. The catalyst of Claim 38 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 40. The catalyst of Claim 35 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 41. The catalyst of Claim 35 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 42. The catalyst of Claim 35 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 43. The catalyst of Claim 35 further including at least one promoter wherein said promoter is added with said cobalt salt solution.

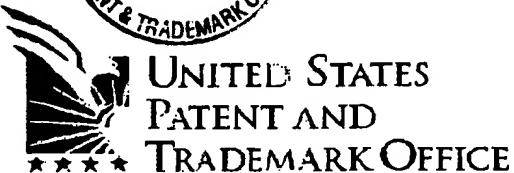
Claim 44. The catalyst of Claim 43 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 45. The catalyst of Claim 35 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claim 46. The catalyst of Claim 35 wherein said support is aluminum oxide and said aqueous cobalt salt solution comprises water and hexaammine cobalt (II) carbonate.

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<p>Süd-Chemie Inc. 1600 West Hill Street Louisville, Kentucky 40210</p> <p>PHONE: (502) 634-7373 FAX: (502) 634-7724</p> <p>CONFIDENTIAL AND PRIVILEGED ATTORNEY CLIENT COMMUNICATION</p> <p>The information contained in this facsimile message is the property of Süd-Chemie Inc. If you are not the intended recipient of this information, any disclosure, copying, distribution, or the taking of any action in reliance on this information, is strictly prohibited. If you have received this message in error, please notify us immediately to arrange for its return. Thank you.</p> <p>TO: U.S. Patent and Trademark Office Examiner: Cam Nguyen Group: 1754 Fax #703-872-9310</p> <p>FROM: Joan L. Simunic Reg. No. 42,125</p> <p>DATE: September 24, 2003</p> <p>PAGES: 20 in total (including cover sheet)</p> <p>RE: U.S. Patent Application No. 09/851,177</p> <p>Remarks: This facsimile is in response to the office action, having a mailing date of March 26, 2003</p> <p>Enclosed are:</p> <p>(1) Transmittal Form. (2) Fee Transmittal for FY 2003 (3) Credit Card Payment Form (4) Petition for Extension of Time (5) Response to Office Action (6) Clean Unmarked Version of Claims Now in Application</p> <p>CERTIFICATE OF FACSIMILE TRANSMISSION UNDER 37 CFR 1.8</p> <p>I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.</p> <p><u>Corina Ferrill</u> <u>9/24/03</u> Corina Ferrill Signature Date</p>		

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Effective 01/01/2003. Patent fees are subject to annual revision.

 Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$ 930.00)

Complete If Known

Application Number	09/851,177
Filing Date	May 8, 2001
First Named Inventor	X. D. Hu
Examiner Name	Cam Nguyen
Art Unit	1754
Attorney Docket No.	ZL 494/01001

METHOD OF PAYMENT (check all that apply)

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Charge any additional fee(s) during the pendency of this application

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity	Small Entity	Fee Description	Fee Paid
Fee Code (\$)	Fee Code (\$)		
1001 750	2001 375	Utility filing fee	<input type="text"/>
1002 330	2002 165	Design filing fee	<input type="text"/>
1003 520	2003 260	Plant filing fee	<input type="text"/>
1004 750	2004 375	Reissue filing fee	<input type="text"/>
1005 160	2005 80	Provisional filing fee	<input type="text"/>
SUBTOTAL (1)		(\$)	n/a

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims	Independent Claims	Multiple Dependent	Extra Claims	Fee from below	Fee Paid
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			- 3** =	<input type="text"/> X <input type="text"/>	<input type="text"/>

Large Entity	Small Entity	Fee Description
Fee Code (\$)	Fee Code (\$)	
1202 18	2202 9	Claims in excess of 20
1201 84	2201 42	Independent claims in excess of 3
1203 280	2203 140	Multiple dependent claim, if not paid
1204 84	2204 42	** Reissue independent claims over original patent
1205 18	2205 9	** Reissue claims in excess of 20 and over original patent
SUBTOTAL (2)		(\$)

*or number previously paid, if greater; For Reissues, see above

3. ADDITIONAL FEES

Large Entity	Small Entity	Fee Description	Fee Paid
Fee Code (\$)	Fee Code (\$)		
1051 130	2051 65	Surcharge - late filing fee or oath	-
1052 50	2052 25	Surcharge - late provisional filing fee or cover sheet	-
1053 130	1053 130	Non-English specification	-
1812 2,520	1812 2,520	For filing a request for ex parte reexamination	-
1804 920*	1804 920*	Requesting publication of SIR prior to Examiner action	-
1805 1,840*	1805 1,840*	Requesting publication of SIR after Examiner action	-
1251 110	2251 55	Extension for reply within first month	-
1252 410	2252 205	Extension for reply within second month	930
1253 930	2253 465	Extension for reply within third month	-
1254 1,450	2254 725	Extension for reply within fourth month	-
1255 1,970	2255 985	Extension for reply within fifth month	-
1401 320	2401 160	Notice of Appeal	-
1402 320	2402 160	Filing a brief in support of an appeal	-
1403 280	2403 140	Request for oral hearing	-
1451 1,510	1451 1,510	Petition to institute a public use proceeding	-
1452 110	2452 55	Petition to revive - unavoidable	-
1453 1,300	2453 650	Petition to revive - unintentional	-
1501 1,300	2501 650	Utility issue fee (or reissue)	-
1502 470	2502 235	Design issue fee	-
1503 630	2503 315	Plant issue fee	-
1460 130	1460 130	Petitions to the Commissioner	-
1807 50	1807 50	Processing fee under 37 CFR 1.17(q)	-
1806 180	1806 180	Submission of Information Disclosure Stmt	-
8021 40	8021 40	Recording each patent assignment per property (times number of properties)	-
1809 750	2809 375	Filing a submission after final rejection (37 CFR 1.129(a))	-
1810 750	2810 375	For each additional invention to be examined (37 CFR 1.129(b))	-
1801 750	2801 375	Request for Continued Examination (RCE)	-
1802 900	1802 900	Request for expedited examination of a design application	-

Other fee (specify):

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$ 930)

(Complete if applicable)

SUBMITTED BY

Name (Print/Type)	Jean L. Simunic	Registration No. (Attorney/Agent)	43,125	Telephone	502-634-7373
Signature				Date	September 23, 2003

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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) <u>7L494/01001</u>
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In re Application of <u>X. D. Hu et al</u>	
Application Number <u>09/851,177</u> Filed <u>May 8, 2001</u>	
For <u>High Surface Area,...</u>	
Art Unit <u>1754</u>	Examiner <u>C. Nguyen</u>

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

<input type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$ _____
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<input checked="" type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$ <u>930</u>
<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$ _____
<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$ _____
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: \$ _____	
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I am the applicant/inventor.

<input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).
<input checked="" type="checkbox"/> attorney or agent of record. Registration Number <u>43,125</u>
<input type="checkbox"/> attorney or agent under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) _____.

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September 23, 2003

Date

502-634-7373

Telephone Number

Joan L. Simunic

Signature

Joan L. Simunic

Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

Total of _____ forms are submitted.

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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) <u>7L494/01001</u>								
<table border="1"> <tr> <td colspan="2">In re Application of <u>X. D. Hu et al</u></td> </tr> <tr> <td colspan="2">Application Number <u>09/851,177</u> Filed <u>May 8, 2001</u></td> </tr> <tr> <td colspan="2">For <u>High Surface Area, ...</u></td> </tr> <tr> <td>Art Unit <u>1754</u></td> <td>Examiner <u>C. Nguyen</u></td> </tr> </table>			In re Application of <u>X. D. Hu et al</u>		Application Number <u>09/851,177</u> Filed <u>May 8, 2001</u>		For <u>High Surface Area, ...</u>		Art Unit <u>1754</u>	Examiner <u>C. Nguyen</u>
In re Application of <u>X. D. Hu et al</u>										
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Art Unit <u>1754</u>	Examiner <u>C. Nguyen</u>									

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

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<input checked="" type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$ <u>930</u>
<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$ _____
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Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: \$ _____.

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<input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).
<input checked="" type="checkbox"/> attorney or agent of record. Registration Number <u>43,125</u>
<input type="checkbox"/> attorney or agent under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) _____.

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Telephone Number

Joan L. Simonic

Signature

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Typed or printed name

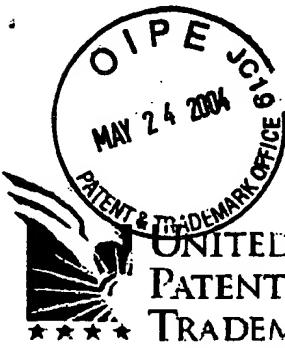
NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

TO:Auto-reply fax to 502 634 7661 COMPANY:



Auto-Reply Facsimile Transmission

UNITED STATES

PATENT AND
TRADEMARK OFFICE

TO: Fax Sender at 502 634 7661

Fax Information

Date Received:

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Received
Cover
Page
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09/24/03 WED 07:47 FAX 502 634 7661	HUMAN RESOURCES	001
<p>Süd-Chemie Inc. 1600 West Hill Street Louisville, Kentucky 40210</p> <p>PHONE: (502) 634-7973 FAX: (502) 634-7724</p> <p>CONFIDENTIAL AND PRIVILEGED ATTORNEY CLIENT COMMUNICATION</p> <p>The information contained in this facsimile message is the property of Süd-Chemie Inc. If you are not the intended recipient of this information, any disclosure, copying, distribution, or the taking of any action in reliance on this information, is strictly prohibited. If you have received this message in error, please notify us immediately to arrange for its return. Thank you.</p> <p>TO: U.S. Patent and Trademark Office Examiner: Cam Nguyen Group: 1754 Fax #703-872-9310</p> <p>FROM: Joan L. Simunic Reg. No. 42,125</p> <p>DATE: September 24, 2003</p> <p>PAGE(S): 20 in total (including cover sheet)</p> <p>RE: U.S. Patent Application No. 09/851,177</p> <p>Remarks: This facsimile is in response to the office action, having a mailing date of March 26, 2003</p> <p>Enclosed are:</p> <p>(1) Transmittal Form. (2) Fee Transmittal for FY 2003 (3) Credit Card Payment Form (4) Petition for Extension of Time (5) Response to Office Action (6) Clean Unmarked Version of Claims Now in Application</p> <p><u>CERTIFICATE OF FACSIMILE TRANSMISSION UNDER 37 CFR 1.8</u></p> <p>I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.</p> <p>Donna Jerrill _____ <u>Donna Jerrill</u> _____ Person Sign. _____ Signature _____ 9/24/03 Date</p>		



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/851,177	05/08/2001	X.D. Hu	ZL494/01001	2722
22884	7590	11/18/2003		EXAMINER
MIDDLETON & REUTLINGER 2500 BROWN & WILLIAMSON TOWER LOUISVILLE, KY 40202				NGUYEN, CAM N
			ART UNIT	PAPER NUMBER
			1754	

DATE MAILED: 11/18/2003

dkt
RECEIVED NOV 20 2003

Please find below and/or attached an Office communication concerning this application or proceeding.

- Notice of Abandonment -



Notice of Abandonment

Application No. 09/851,177	Applicant(s) Hu et al.
Examiner Cam Nguyen	Art Unit 1754

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

This application is abandoned in view of:

1. Applicant's failure to timely file a proper reply to the Office letter mailed on Mar 26, 2003.
 - (a) A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply (including a total extension of time of _____ month(s)) which expired on _____.
 - (b) A proposed reply was received on _____, but it does not constitute a proper reply under 37 CFR 1.113(a) to the final rejection.

(A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114).
 - (c) A reply was received on _____ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
 - (d) No reply has been received.
2. Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
 - (a) The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
 - (b) The submitted issue fee of \$ _____ is insufficient. A balance of \$ _____ is due.

The issue fee required by 37 CFR 1.18 is \$ _____. The publication fee, if required by 37 CFR 1.18(d) is \$ _____.
 - (c) The issue fee and publication fee, if applicable, has not been received.
3. Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
 - (a) Proposed new formal drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
 - (b) No corrected drawings have been received.
4. The letter of express abandonment which is signed by the attorney or agent of record, the assignee of the entire interest, or all of the applicants.
5. The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34(a)) upon the filing of a continuing application.
6. The decision by the Board of Patent Appeals and Interferences rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.
7. The reason(s) below:

*Cam Nguyen
11/19/03*

Petitions to revive under 37 CFR 1.137(a) or (b), or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.

O
MAY 24 2004
PATENT AND TRADEMARK OFFICE
IN THE UNITED STATES PATENT AND TRADEMA 'K OFFICE
Washington, D.C., United States of America

In re Application of HU, X.D.; et al.

Serial No.: 09/851,177

Filed: 05/08/2001

For: HIGH SURFACE AREA, SMALL
CRYSTALLITE SIZE CATALYST FOR
FISCHER-TROPSCH SYNTHESIS

Mail Stop Non-Fee
Director of Technology Center Art Unit 1754
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF TRANSMISSION UNDER 37 CFR 1.8 (b)

Dear Sir:

We kindly request the United States Patent Office to consider the enclosed response to the 3/26/03 office action timely filed as it was faxed on September 24, 2003 and can be evidenced by the Auto-Reply Facsimile Transmission report.

In accordance with 37 CFR 1.8 (b), we are promptly informing the Office we previously transmitted by fax a response to the office action with mailing date of 03/26/03. I hereby state the response was sent by fax on 9/24/03 by Donna Ferrill.

We have included an additional copy of the response as well as the copy of the sending unit's report confirming transmission.

Respectfully submitted,


Joan Simunic, Reg. No. 43,125
Sud-Chemie Inc.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/851,177	05/08/2001	X.D. Hu	ZL494/01001	2722
22884	7590	11/18/2003	EXAMINER	
MIDDLETON & REUTLINGER 2500 BROWN & WILLIAMSON TOWER LOUISVILLE, KY 40202			NGUYEN, CAM N	
ART UNIT		PAPER NUMBER		7
1754				

DATE MAILED: 11/18/2003

RECEIVED NOV 26 2003
JKT

Please find below and/or attached an Office communication concerning this application or proceeding.

- Notice of Abandonment -

Notice of AbandonmentApplication No.
09/851,177

Applicant(s)

Hu et al.

Examiner

Cam Nguyen

Art Unit

1754

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

This application is abandoned in view of:

1. Applicant's failure to timely file a proper reply to the Office letter mailed on Mar 26, 2003.
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 - (b) The submitted issue fee of \$ _____ is insufficient. A balance of \$ _____ is due.

The issue fee required by 37 CFR 1.18 is \$ _____. The publication fee, if required by 37 CFR 1.18(d) is \$ _____.
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 - (a) Proposed new formal drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
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5. The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34(a)) upon the filing of a continuing application.
6. The decision by the Board of Patent Appeals and Interferences rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.
7. The reason(s) below:

Petitions to revive under 37 CFR 1.137(a) or (b), or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.

TO:Auto-reply fax to 302 634 7661 COMPANY:



Auto-Reply Facsimile Transmission



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09/24/03 FED 07:47 FAX 502 634 7661

HUMAN RESOURCES

001

Süd-Chemie Inc.
1600 West Hill Street
Louisville, Kentucky 40210

PHONE: (502) 634-7373
FAX: (502) 634-7724

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TO: U.S. Patent and Trademark Office
Examiner: Cam Nguyen Group: 1754
Fax #703-672-9310

FROM: Joan L. Simunic Reg. No. 43,125

DATE: September 24, 2003

PAGES: 20 in total (including cover sheet)

RE: U.S. Patent Application No.09/851,177

Remarks: This facsimile is in response to the office action, having a mailing date of March 26, 2003

Enclosed are:

- (1) Transmittal Form.
- (2) Fee Transmittal for JV 2003
- (3) Credit Card Payment Form
- (4) Petition for Extension of Time
- (5) Response to Office Action
- (6) Clean Unmarked Version of Claims Now in Application

CERTIFICATE OF FACSIMILE TRANSMISSION UNDER 37 CFR 1.8

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Donna Ferrill
Person Sign ing

Donna Ferrill
Signature

9/24/03
Date

Received from <502 634 7661> at 9/24/03 8:36:34 AM (Eastern Daylight Time)



Süd-Chemie Inc.
1600 West Hill Street
Louisville, Kentucky 40210

PHONE: (502) 634-7373
FAX: (502) 634-7724

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TO: U.S. Patent and Trademark Office
Examiner: Cam Nguyen Group: 1754
Fax #703-872-9306

FROM: Joan L.Simunic Reg. No. 43,125
DATE: September 24, 2003
PAGES: 20 in total (including cover sheet)
RE: U.S. Patent Application No.09/851,177

Remarks: This facsimile is in response to the office action, having a mailing date of March 26, 2003

Enclosed are:

- (1) Transmittal Form.
- (2) Fee Transmittal for FY 2003
- (3) Credit Card Payment Form
- (4) Petition for Extension of Time
- (5) Response to Office Action
- (6) Clean Unmarked Version of Claims Now in Application

CERTIFICATE OF FACSIMILE TRANSMISSION UNDER 37 CFR 1.8

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Donna Ferrill
Person Signing


Signature

9/24/03
Date



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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

		Application Number	09/851,177
		Filing Date	May 8, 2001
		First Named Inventor	X. D. Hu
		Art Unit	1754
		Examiner Name	Cam Nguyen
Total Number of Pages in This Submission	20	Attorney Docket Number	ZL 494/01001

ENCLOSURES (Check all that apply)

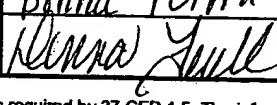
<input checked="" type="checkbox"/> Fee Transmittal Form <input checked="" type="checkbox"/> Fee Attached <input checked="" type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input checked="" type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/ Incomplete Application <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation <input type="checkbox"/> Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____	<input type="checkbox"/> After Allowance communication to Technology Center (TC) <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): <input type="checkbox"/> Postcard
<input type="text" value="Remarks"/>		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Joan L. Simunic, Reg. 43,125
Signature	
Date	September 23, 2008

CERTIFICATE OF TRANSMISSION/MAILING

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Typed or printed name	Donna Fornill	
Signature		Date

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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PTO/SB/17 (08-03)
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FEE TRANSMITTAL for FY 2003

Effective 01/01/2003. Patent fees are subject to annual revision.

Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT	(\$ 930.00)
-------------------------	-------------

Complete if Known

Application Number	09/851,177
Filing Date	May 8, 2001
First Named Inventor	X. D. Hu
Examiner Name	Cam Nguyen
Art Unit	1754
Attorney Docket No.	ZL 494/01001

METHOD OF PAYMENT (check all that apply)

Check Credit card Money Order Other None

Deposit Account:

Deposit Account Number	
Deposit Account Name	

The Director is authorized to: (check all that apply)

Charge fee(s) indicated below Credit any overpayments
 Charge any additional fee(s) during the pendency of this application
 Charge fee(s) indicated below, except for the filing fee
 to the above-identified deposit account.

FEE CALCULATION (continued)

1. BASIC FILING FEE

Large Entity	Small Entity	Fee Description	Fee Paid
Fee Code (\$)	Fee Code (\$)		
1001 750	2001 375	Utility filing fee	
1002 330	2002 165	Design filing fee	
1003 520	2003 260	Plant filing fee	
1004 750	2004 375	Reissue filing fee	
1005 160	2005 80	Provisional filing fee	
SUBTOTAL (1)		(\$ n/a)	

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims	Extra Claims		Fee Paid	
	Fee from below			
	-20** =	X		
Independent Claims	- 3** =			
Multiple Dependent	=			

Large Entity	Small Entity	Fee Description
Fee Code (\$)	Fee Code (\$)	
1202 18	2202 9	Claims in excess of 20
1201 84	2201 42	Independent claims in excess of 3
1203 280	2203 140	Multiple dependent claim, if not paid
1204 84	2204 42	** Reissue independent claims over original patent
1205 18	2205 9	** Reissue claims in excess of 20 and over original patent
SUBTOTAL (2)		(\$)

**or number previously paid, if greater; For Reissues, see above

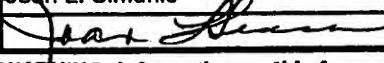
3. ADDITIONAL FEES

Large Entity	Small Entity	Fee Description	Fee Paid
Fee Code (\$)	Fee Code (\$)		
1051 130	2051 65	Surcharge - late filing fee or oath	-
1052 50	2052 25	Surcharge - late provisional filing fee or cover sheet	-
1053 130	1053 130	Non-English specification	-
1812 2,520	1812 2,520	For filing a request for ex parte reexamination	-
1804 920*	1804 920*	Requesting publication of SIR prior to Examiner action	-
1805 1,840*	1805 1,840*	Requesting publication of SIR after Examiner action	-
1251 110	2251 55	Extension for reply within first month	-
1252 410	2252 205	Extension for reply within second month	930
1253 930	2253 465	Extension for reply within third month	
1254 1,450	2254 725	Extension for reply within fourth month	-
1255 1,970	2255 985	Extension for reply within fifth month	-
1401 320	2401 160	Notice of Appeal	-
1402 320	2402 160	Filing a brief in support of an appeal	-
1403 280	2403 140	Request for oral hearing	-
1451 1,510	1451 1,510	Petition to institute a public use proceeding	-
1452 110	2452 55	Petition to revive - unavoidable	-
1453 1,300	2453 650	Petition to revive - unintentional	-
1501 1,300	2501 650	Utility issue fee (or reissue)	-
1502 470	2502 235	Design issue fee	-
1503 630	2503 315	Plant issue fee	-
1460 130	1460 130	Petitions to the Commissioner	-
1807 50	1807 50	Processing fee under 37 CFR 1.17(q)	-
1806 180	1806 180	Submission of Information Disclosure Stmt	-
8021 40	8021 40	Recording each patent assignment per property (times number of properties)	-
1809 750	2809 375	Filing a submission after final rejection (37 CFR 1.129(a))	-
1810 750	2810 375	For each additional invention to be examined (37 CFR 1.129(b))	-
1801 750	2801 375	Request for Continued Examination (RCE)	-
1802 900	1802 900	Request for expedited examination of a design application	-
Other fee (specify):			

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$ 930)

(Complete if applicable)

SUBMITTED BY	
Name (Print/Type)	Jean L. Simunic
Signature	

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) <u>71494/01001</u>
In re Application of <u>X. D. Hu et al</u>		
Application Number <u>09/851,177</u>		Filed <u>May 8, 2001</u>
For <u>High Surface Area...</u>		
Art Unit <u>1754</u>	Examiner <u>C. Nguyen</u>	

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

<input type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$ _____
<input type="checkbox"/> Two months (37 CFR 1.17(a)(2))	\$ _____
<input checked="" type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$ <u>930</u>
<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$ _____
<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$ _____
 <input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: \$ _____.	
<input type="checkbox"/> A check in the amount of the fee is enclosed.	
<input checked="" type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.	
<input type="checkbox"/> The Director has already been authorized to charge fees in this application to a Deposit Account.	
<input type="checkbox"/> The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.	

I have enclosed a duplicate copy of this sheet.

I am the applicant/inventor.

<input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).
<input checked="" type="checkbox"/> attorney or agent of record. Registration Number <u>43,125</u>
<input type="checkbox"/> attorney or agent under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) _____.

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September 23, 2003
Date

502-634-7373
Telephone Number

Joan L. Simonic
Signature

Joan L. Simonic
Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

Total of _____ forms are submitted.

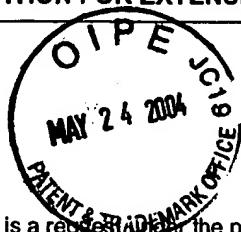
This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional) 72494/01001



In re Application of X. D. Hu et al	
Application Number 09/851,177 Filed May 8, 2001	
For High Surface Area, ...	
Art Unit 1754	Examiner C. Nguyen

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

<input type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$ _____
<input type="checkbox"/> Two months (37 CFR 1.17(a)(2))	\$ _____
<input checked="" type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$ 930
<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$ _____
<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$ _____
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: \$ _____	
<input type="checkbox"/> A check in the amount of the fee is enclosed.	
<input checked="" type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.	
<input type="checkbox"/> The Director has already been authorized to charge fees in this application to a Deposit Account.	
<input type="checkbox"/> The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.	

I have enclosed a duplicate copy of this sheet.

I am the applicant/inventor.

<input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).
<input checked="" type="checkbox"/> attorney or agent of record. Registration Number 43,125
<input type="checkbox"/> attorney or agent under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) _____.

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September 23, 2003
Date

502-634-7373
Telephone Number

Joan L. Simonc
Signature
Joan L. Simonc
Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application Number : 09/851,177
Applicants : X. D. Hu et al.
Filing Date : 05/08/2001
TC/A.U. : 1754
Examiner : Cam Nguyen

Attorney Docket No. : ZL494/01001
Customer No. :
Title: : High Surface Area, Small Crystallite Size Catalyst for Fischer-Tropsch Synthesis

Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

ADMENDMENT

Sir:

In response to the Office Action mailed March 26, 2003, please amend the above-identified application as follows:

Amendments to the Specification: There are no changes are being made to the specification.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Amendments to the Drawings: There are no changes are being made to the drawings.

Remarks/Arguments begin on page 6 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1. (currently amended) A catalyst for use in the Fischer-Tropsch process, said catalyst comprising a catalyst particle, which comprises at least one metal that is an efficient carbon monoxide adsorber and at least one promoter, said metal and said promoter being dispersed on a support to form a said catalyst particle, said particle having a BET surface area of from about 100 m²/g to about 250 m²/g, and said metal and said promoter being are dispersed on the support such that the crystallite size of the metal oxide is from about 40 Å to about 200 Å, and said particle having an essentially smooth, homogeneous surface morphology.

Claim 2. (original) The catalyst of Claim 1 wherein said particle comprises from about 5 wt % to about 60 wt % cobalt, and from about 0.0001 wt % to about 1 wt % of a first promoter, and from about 0.01 wt % to about 5 wt % of a second promoter.

Claim 3. (original) The catalyst of Claim 2 wherein said particle comprises from about 10 wt% to about 30 wt % cobalt, and from about 0.01 wt % to about 0.05 wt % of said first promoter, and from about 0.1 wt % to about 1 wt % of said second promoter.

Claim 4. (original) The catalyst of Claim 1 wherein said metal is selected from the group consisting of nickel, cobalt, iron, ruthenium, osmium, platinum, palladium, iridium, rhenium, molybdenum, chromium, tungsten, vanadium, rhodium, copper, zinc, and combinations thereof.

Claim 5. (original) The catalyst of Claim 4 wherein said metal is cobalt.

Claim 6. (currently amended) The catalyst of Claim 1 wherein said promoter is selected from the group consisting of boron, cerium, chromium, copper, iridium, iron, lanthanum, manganese, molybdenum, palladium, platinum, rhenium, rhodium, ruthenium, strontium, tungsten, vanadium, zinc, sodium oxide, potassium oxide, rubidium oxide, cesium oxide, magnesium oxide, titanium oxide, zirconium oxide, and other rare earth metals, such as scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, other rare earth metals and combinations thereof.

Claim 7. (original) The catalyst of Claim 2 wherein said first promoter is selected from the group consisting of palladium, platinum, ruthenium, rhenium, rhodium, iridium and a combination thereof; and said second promoter is selected from the group consisting of potassium, boron, cesium, lanthanum, cerium, strontium, scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, palladium, platinum, ruthenium, rhenium, rhodium, iridium and combinations thereof.

Claim 8. (original) The catalyst of Claim 1 wherein said support is selected from the group consisting of aluminum oxide, γ-alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, γ-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 9. (original) The catalyst of Claim 8 wherein said support is γ-alumina.

Claim 10. (original) The catalyst of Claim 9 wherein said support has a particle size of from about 60 μm to about 150 μm , a surface area of from about 90 m^2/g to about 210 m^2/g , a pore volume of from about 0.35 ml/g to about 0.50 ml/g , and a pore diameter of from about 8 nm to about 20 nm.

Claim 11. (currently amended) A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size, and wherein said particle is formed by the steps of:

- a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;
- b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;
- c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is essentially completely reacted with said support;
- d) separating said slurry into a solid portion and a liquor portion;
- e) washing said solid portion with water;
- f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles; and
- g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours.

Claim 12. (original) The catalyst of Claim 11 wherein said support is selected from the group consisting of aluminum oxide, γ -alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, γ -zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 13. (original) The catalyst of Claim 12 wherein said support is aluminum oxide.

Claim 14. (original) The catalyst of Claim 12 wherein said support has a particle size of from about 60 μm to about 150 μm , a surface area of from about 90 m^2/g to about 210 m^2/g , a pore volume of from about 0.35 ml/g to about 0.50 ml/g , and a pore diameter of from about 8 nm to about 20 nm.

Claim 15. (original) The catalyst of Claim 11 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitrilo tetraacetic acid, and combinations thereof.

Claim 16. (currently amended) The catalyst of Claim 15 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water ~~molecules~~, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 17. (original) The catalyst of Claim 16 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate.

Claim 18. (original) The catalyst of Claim 11 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 19. (original) The catalyst of Claim 11 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 20. (original) The catalyst of Claim 11 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 21. (original) The catalyst of Claim 11 wherein said particles are further stabilized to prevent pyrophoric reactions when said particles are in the presence of air.

Claim 22. (currently amended) The catalyst of Claim 21 wherein said particles are stabilized by ~~being coated~~ coating with oil.

Claim 23. (currently amended) The catalyst of Claim 11 further including at least one promoter, wherein said promoter ~~being~~ is added with said cobalt salt solution.

Claim 24. (original) The catalyst of Claim 23 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 25. (original) The catalyst of Claim 11 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claims 26 – 34. (canceled)

26. ~~A method for making a catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle, said method comprising:~~
~~a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;~~
~~b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;~~
~~c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is essentially completely reacted with said support;~~
~~d) separating said slurry into a solid portion and a liquor portion;~~
~~e) washing said solid portion with water;~~
~~f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles; and~~
~~g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours.~~

27. ~~The catalyst of Claim 26 wherein said support is aluminum oxide.~~

28. ~~The catalyst of Claim 27 wherein said cobalt (II) complex is hexaamminecobalt (II) carbonate.~~

29. The catalyst of Claim 26 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

30. The catalyst of Claim 26 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

31. The catalyst of Claim 26 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

32. The catalyst of Claim 26 wherein said particles are further stabilized by being coated with oil.

33. The catalyst of Claim 26 further including at least one promoter, said promoter being added with said cobalt salt solution.

34. The catalyst of Claim 33 wherein said promoter is a metal salt selected from the group consisting of rhodium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 35. (new) A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle, wherein said particle is formed by the steps of:

- a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;
- b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;
- c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is reacted with said support;
- d) separating said slurry into a solid portion and a liquor portion;
- e) washing said solid portion with water;
- f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles;
- g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours; and
- h) stabilizing said particles to prevent pyrophoric reactions when said particles are in the presence of air by coating said particles with oil.

Claim 36. (new) The catalyst of Claim 35 wherein said support is selected from the group consisting of aluminum oxide, γ -alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, γ -zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 37. (new) The catalyst of Claim 36 wherein said support has a particle size of from about 60 μm to about 150 μm , a surface area of from about 90 m^2/g to about 210 m^2/g , a pore volume of from about 0.35 ml/g to about 0.50 ml/g , and a pore diameter of from about 8 nm to about 20 nm.

Claim 38. (new) The catalyst of Claim 35 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitro tetraacetic acid, and combinations thereof.

Claim 39. (new) The catalyst of Claim 38 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 40. (new) The catalyst of Claim 35 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 41. (new) The catalyst of Claim 35 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 42. (new) The catalyst of Claim 35 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 43. (new) The catalyst of Claim 35 further including at least one promoter wherein said promoter is added with said cobalt salt solution.

Claim 44. (new) The catalyst of Claim 43 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 45. (new) The catalyst of Claim 35 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claim 46. (new) The catalyst of Claim 35 wherein said support is aluminum oxide and said aqueous cobalt salt solution comprises water and hexaammine cobalt (II) carbonate.

Attachment: Clean Unmarked Version of Claims Now in Application

REMARKS / ARGUMENTS

Remarks Regarding Informalities and Claims Rejected Under 35 USC §112

Claims 1 – 25 remain in the application. Claims 35 – 46 have been added to the application and are presented for examination. Claims 26 – 34 have been withdrawn in response to a requirement by the Examiner that the claims be restricted to Claims 1 – 25, drawn to a catalyst, or to Claims 26 – 34, drawn to a process of preparing a catalyst. In view of the Examiner's earlier restriction requirement, applicant retains the right to present claims 26 – 34 in a divisional application.

The Examiner objected to claims 1, 11, 16, 22, and 23 because of noted informalities. As proposed by the Examiner, claims 1 and 11 have been reworded in lines 1 – 3. Further, as proposed by the Examiner: in claim 1, line 5, "being" has been replaced with "are"; in claim 11, line 2, "being" has been replaced with "is"; and, in claim 16, line 2, "molecules" has been deleted to retain consistency with the language of claim 15. Further formality amendments include: in claim 22, line 1, "being coated" has been deleted and replaced with "coating"; and in claim 23, line 2, "being" has been replaced with "is" and "wherein" has been added. The amendments of claim 22 and claim 23 were suggested by the Examiner but required further correction than proposed to have grammatically correct sentences after amendment. Finally, in claim 11, step (c), "essentially completely" has been deleted to address a concern raised by the Examiner with the original language. No new subject matter has been added in making these amendments.

The Examiner objected to claim 17 based on the failure to comply to 37 CFR 1.75(c). The applicant respectfully challenges this objection. Claim 17 depends from claim 16 which recites a cobalt (II) complex having "coordination sphere ligands selected from the group consisting of water, ammonia, ..." Claim 17 recites "The catalyst of Claim 16 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate." As is known in the art, the "hexaammine cobalt (II) carbonate" coordination sphere ligands are ammonia, as recited in claim 16. The carbonate is not a coordination sphere ligand but rather a counterion to the positively charged cobalt ion. Thus, applicant requests the Examiner to reconsider his objection with respect to claim 17.

Claims 1 – 10 and 16 – 17 were rejected under 35 U.S.C. §112. The Examiner states that Claim 1 recites the limitation "the metal oxide" with insufficient antecedent basis for this limitation. The applicant respectfully notes that in the specification on page 4, lines 2 – 3, the catalyst has "a metal oxide crystallite size of from about 40 Å to about 200 Å." On page 12, lines 11 – 15, the metal oxide is more narrowly defined as the "cobalt oxide crystallite size" – and as is known in the art, cobalt is considered a metal when in reference to oxides – and the "cobalt oxide crystallite size ... is greater than about 40 Å diameter, and is preferably less than about 200 Å." Thus, applicant requests the Examiner to reconsider his objection under 35 U.S.C. §112 with respect to claim 1, and its dependent claims 2 – 10. If it would expedite matters, the applicant is willing to amend the paragraph on page 12 to include the more inclusive language of page 4 if so requested by the Examiner.

As noted by the Examiner, Claim 6 included the indefinite phrase "such as". Claim 6 has been amended to delete this phrase and should now be in allowable form.

As noted by the Examiner, Claim 16 included improper Markush terminology. Claim 16 has been amended to be consistent with the correct Markush phrase, and claim 16 and its dependent claim 17 should now be in allowable form.

Remarks Regarding Allowable Subject Matter

The Examiner has indicated that Claim 22 is objected to as being dependent on a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In response to this rejection, new claim 35 is presented. New claim 35 includes the limitations of rejected independent claims 11 (preamble and steps a – g), rejected dependent claim 21 and objected to dependent claim 22 (step h). Claims 36 – 46 have been added as claims dependent on new independent claim 35. As amended, independent claim 35 is believed to now be in allowable form. Because they depend from an allowable claim, dependent claims 36 – 46 are also believed to now be in allowable form.

The Examiner has also indicated that claims 1 – 10 would be allowable if the 35 U.S.C. §112 rejection is overcome. As noted in the prior section, page 4, lines 2 – 3, of the specification teach a catalyst that has “a metal oxide crystallite size of from about 40 Å to about 200 Å” and page 12, lines 11 – 15, of the specification teach “cobalt oxide crystallite size ... greater than about 40 Å diameter, and is preferably less than about 200 Å.” Applicant is willing to amend the paragraph on page 12 to include the more inclusive language of page 4 if so requested by the Examiner.

Remarks Regarding Citations

Applicant has made note of the prior art recited by the Examiner in Paragraph 15 of his Office Action mailed March 26, 2003.

Remarks Regarding Claims Rejected Under 35 USC §102(b) and 35 USC §103(a)

The Examiner has rejected independent claim 11 and dependent claims 12, 14 – 21, 23 and 25 under 35 U.S.C 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Shen et al., U.S. Patent 5,962,367 (“the ‘367 patent”). Applicant respectfully traverses both rejections.

The Examiner has further rejected independent claim 11 and dependent Claims 12 – 13, 15 – 21 and 23 – 25 under 35 U.S.C 102(b) as anticipated by or in the alternative, under 35 U.S.C. 103(a) as obvious over Sapienza et al., U.S. Patent 4,396,539 (“the ‘539 patent”). Applicant respectfully traverses both rejections.

Summary of the Present Invention

The Fischer-Tropsch catalyst of the present invention is a transition metal-based catalyst having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support, and a small metal oxide crystallite size. In a first embodiment, the catalyst has a surface area of from about 100 m²/g to about 250 m²/g; an essentially smooth, homogeneous surface morphology; an essentially uniform distribution of metal throughout an essentially inert support; and a metal oxide crystallite size of from about 40 Å to about 200 Å. Optionally, the catalyst may further comprise at least one promoter.

The Fischer-Tropsch catalyst of independent claim 11 of the present application, as amended, is a catalyst comprising cobalt dispersed on a support to form a catalyst particle having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size, and wherein the particle is formed by several prescribed steps. Claims 12 – 25 of the present application depend from independent claim 11.

As provided in dependent claim 14, the catalyst of claim 11 may be prepared from a support having a particle size of from about 60 µm to about 150 µm, a surface area of from about 90 m²/g to about 210 m²/g, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm. However, as discussed on page 28, line 1 through page 29, line 4 and as shown in Figures 1A – 4, two catalysts prepared with the same support material can have significantly different physical characteristics depending upon the process used to make the catalyst. (N.B.: In the examples of the present application each catalyst was prepared using a Puralox SCCa 5/150 support having a surface area of about 160 m²/g, a pore volume of about 0.50 ml/g, and a pore diameter of about 12.55 nm.) The steps outlined in independent claim 11 result in a catalyst particle having the desired physical characteristics. Prior art methods of catalyst particle preparation, even starting with the same support, do not result in the catalyst particle of the present invention.

Summary of U.S. Patent 5,962,367, Shen et al.

U.S. Patent 5,962,367 teaches a process for preparing a catalyst support primarily formed of titania. The catalyst support comprises 60 wt% to 100 wt % titania as TiO₂ and 0 wt% to 40 wt % alumina as Al₂O₃. As noted by the Examiner, the ‘367 patent teaches a cobalt molybdate catalyst supported on a titania support, wherein the support has a surface area ranging from 80 m²/g to 200 m²/g, a pore volume of from about 0.3 ml/g to about 0.5 ml/g, and a pore diameter of from about 6 nm to about 20 nm.

The ‘367 patent then teaches using this catalyst support to prepare a cobalt molybdate catalyst using an impregnation process. At column 5, lines 6 – 8, the ‘367 states “the dynamic co-impregnation

method is used for supporting the cobalt and molybdenum active components ..." In Examples 4 – 7, the support is "immersed into the impregnating solution ..." for the preparation of the catalyst.

However, the '367 patent does not teach or suggest that the catalyst resulting from the impregnation process using the '367 titania support has a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size as is seen with the preparation process of the present invention. Rather, there is nothing in the '367 patent that suggests that the physical characteristics of the cobalt molybdate catalyst prepared by the impregnation process would be any different than the catalysts prepared by the prior art impregnation method and reported in Example 6 (and Figures 2A, 2B and 4) of the present application. Further, the catalyst of the present invention made by the process of instant claim 11 would not be anticipated or obvious merely because a titania support is used, or the physical characteristics of the support are similar to supports of the prior art, or because a promoter is added. Thus, independent claim 11 and its dependent claims 12 – 25 are not anticipated nor obvious in view of U.S. Patent 5,962,367.

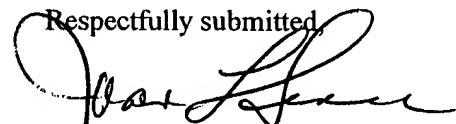
Summary of U.S. Patent 4,396,539, Sapienza et al.

U.S. Patent 4,396,539 teaches a process for preparing a catalyst suitable for Fischer-Tropsch synthesis wherein the catalyst is composed of palladium or platinum and cobalt supported on a solid support. More specifically, the '539 patent teaches an alumina, silica gel, kieselguhr, or zinc oxide support that is impregnated by immersion of the support in an aqueous solution of the salt of a palladium or platinum metal. The palladium- or platinum-treated support is then immersed in a solution containing primarily cobalt.

The objective of the process set forth in the '539 patent is to achieve a catalyst particle with the metal loading as a coating around the support. The catalyst structure depicted in Figure 5 is believed to "best represent the idealized structure of this catalyst" (column 4, lines 9 – 21). By contrast, the process of claim 11 of the present invention produces a catalyst that has "an essentially uniform distribution of cobalt throughout the support". In other words, the process taught in the '539 patent teaches away from the desired product of the present invention. Thus, independent claim 11 and its dependent claims 12 – 25 are not anticipated nor obvious in view of U.S. Patent 4,396,539.

Because U.S. Patent 5,962,367 and U.S. Patent 4,396,539 each teach a process for preparing a catalyst that relies on impregnation to deliver the metal to the support, the product-by-process taught by the amended claim 11 of the present application is neither anticipated nor obvious. Thus, applicant respectfully requests that the §102(b) and the §103(a) rejections be withdrawn and that independent claim 11, as amended, and its dependent claims 12 – 25, be allowed.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted


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Clean Unmarked Version of Claims Now in Application

Claim 1. A catalyst for use in the Fischer-Tropsch process, said catalyst comprising a catalyst particle, which comprises at least one metal that is an efficient carbon monoxide adsorber and at least one promoter dispersed on a support to form said catalyst particle, said particle having a BET surface area of from about 100 m²/g to about 250 m²/g, and said metal and said promoter are dispersed on the support such that the crystallite size of the metal oxide is from about 40 Å to about 200 Å, and said particle having an essentially smooth, homogeneous surface morphology.

Claim 2. The catalyst of Claim 1 wherein said particle comprises from about 5 wt % to about 60 wt % cobalt, and from about 0.0001 wt % to about 1 wt % of a first promoter, and from about 0.01 wt % to about 5 wt % of a second promoter.

Claim 3. The catalyst of Claim 2 wherein said particle comprises from about 10 wt% to about 30 wt % cobalt, and from about 0.01 wt % to about 0.05 wt % of said first promoter, and from about 0.1 wt % to about 1 wt % of said second promoter.

Claim 4. The catalyst of Claim 1 wherein said metal is selected from the group consisting of nickel, cobalt, iron, ruthenium, osmium, platinum, palladium, iridium, rhenium, molybdenum, chromium, tungsten, vanadium, rhodium, copper, zinc, and combinations thereof.

Claim 5. The catalyst of Claim 4 wherein said metal is cobalt.

Claim 6. The catalyst of Claim 1 wherein said promoter is selected from the group consisting of boron, cerium, chromium, copper, iridium, iron, lanthanum, manganese, molybdenum, palladium, platinum, rhenium, rhodium, ruthenium, strontium, tungsten, vanadium, zinc, sodium oxide, potassium oxide, rubidium oxide, cesium oxide, magnesium oxide, titanium oxide, zirconium oxide, scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, other rare earth metals and combinations thereof.

Claim 7. The catalyst of Claim 2 wherein said first promoter is selected from the group consisting of palladium, platinum, ruthenium, rhenium, rhodium, iridium and a combination thereof, and said second promoter is selected from the group consisting of potassium, boron, cesium, lanthanum, cerium, strontium, scandium, yttrium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, palladium, platinum, ruthenium, rhenium, rhodium, iridium and combinations thereof.

Claim 8. The catalyst of Claim 1 wherein said support is selected from the group consisting of aluminum oxide, γ -alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, y-zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 9. The catalyst of Claim 8 wherein said support is γ -alumina.

Claim 10. The catalyst of Claim 9 wherein said support has a particle size of from about 60 μ m to about 150 μ m, a surface area of from about 90 m²/g to about 210 m²/g, a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 11. A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle having a high surface area, a smooth, homogeneous surface morphology, an essentially uniform distribution of cobalt throughout the support and a small metal oxide crystallite size, and wherein said particle is formed by the steps of:

- a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;
- b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;
- c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is reacted with said support;
- d) separating said slurry into a solid portion and a liquor portion;
- e) washing said solid portion with water;
- f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles; and
- g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours.

Claim 12. The catalyst of Claim 11 wherein said support is selected from the group consisting of aluminum oxide, γ -alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, γ -zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 13. The catalyst of Claim 12 wherein said support is aluminum oxide.

Claim 14. The catalyst of Claim 12 wherein said support has a particle size of from about 60 μm to about 150 μm , a surface area of from about 90 m^2/g to about 210 m^2/g , a pore volume of from about 0.35 ml/g to about 0.50 ml/g, and a pore diameter of from about 8 nm to about 20 nm.

Claim 15. The catalyst of Claim 11 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitrilo tetraacetic acid, and combinations thereof.

Claim 16. The catalyst of Claim 15 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 17. The catalyst of Claim 16 wherein said cobalt (II) complex is hexaammine cobalt (II) carbonate.

Claim 18. The catalyst of Claim 11 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 19. The catalyst of Claim 11 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 20. The catalyst of Claim 11 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 21. The catalyst of Claim 11 wherein said particles are further stabilized to prevent pyrophoric reactions when said particles are in the presence of air.

Claim 22. The catalyst of Claim 21 wherein said particles are stabilized by coating with oil.

Claim 23. The catalyst of Claim 11 further including at least one promoter wherein said promoter is added with said cobalt salt solution.

Claim 24. The catalyst of Claim 23 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 25. The catalyst of Claim 11 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claim 35. A catalyst for use in the Fischer-Tropsch process, said catalyst comprising cobalt dispersed on a support to form a catalyst particle, wherein said particle is formed by the steps of:

- a) adding said support to water, with agitation, to form a slurry, and maintaining a slurry temperature at from about 35°C to about 210°C;
- b) adding an aqueous cobalt salt solution having a pH value greater than the point of zero charge of said support to said slurry with agitation and while maintaining said slurry temperature at from about 65°C to about 120°C;
- c) agitating said slurry and maintaining said slurry temperature at from about 65°C to about 120°C until said cobalt salt is reacted with said support;
- d) separating said slurry into a solid portion and a liquor portion;
- e) washing said solid portion with water;
- f) drying and calcining said solid portion at from about 90°C to about 375°C to form catalyst particles;
- g) reducing said catalyst particles by heating said particles from ambient temperature to from about 300°C to about 500°C at a rate of from about 0.1°C/min to about 10°C/min over a period of from about 5 hours to about 40 hours; and
- h) stabilizing said particles to prevent pyrophoric reactions when said particles are in the presence of air by coating said particles with oil.

Claim 36. The catalyst of Claim 35 wherein said support is selected from the group consisting of aluminum oxide, γ -alumina, alumina monohydrate, alumina trihydrate, alumina-silica, magnesium silicate, silica, silicate, silicalite, γ -zeolite, mordenite, titania, thoria, zirconia, niobia, hydrotalcite, kieselguhr, attapulgite clay, zinc oxide, other clays, other zeolites and combinations thereof.

Claim 37. The catalyst of Claim 36 wherein said support has a particle size of from about 60 μm to about 150 μm , a surface area of from about 90 m^2/g to about 210 m^2/g , a pore volume of from about 0.35 ml/g to about 0.50 ml/g , and a pore diameter of from about 8 nm to about 20 nm.

Claim 38. The catalyst of Claim 35 wherein said cobalt salt solution comprises water and a cobalt (II) complex having coordination sphere ligands selected from the group consisting of water, chloride ion, ammonia, pyridine, triphenylphosphine, 1,2-diaminoethane, diethylenetriamine, triethylenetetraamine, acetate, oxalate, 2,4-pentanedione, ethylenedinitilo tetraacetic acid, and combinations thereof.

Claim 39. The catalyst of Claim 38 wherein said cobalt (II) complex has coordination sphere ligands selected from the group consisting of water, ammonia, pyridine, diaminoethane, diethylenetriamine, triethylenetetraamine, and a combination thereof.

Claim 40. The catalyst of Claim 35 wherein the slurry temperature is maintained at from about 65°C to about 120°C in step a).

Claim 41. The catalyst of Claim 35 wherein said solid portion is dried at from about 120°C to about 260°C in step f).

Claim 42. The catalyst of Claim 35 wherein said particles are reduced in step g) by heating said particles from ambient temperature to about 350°C at a rate of about 1.0°C/min and then holding said particles at about 350°C for from about 12 hours to about 16 hours.

Claim 43. The catalyst of Claim 35 further including at least one promoter wherein said promoter is added with said cobalt salt solution.

Claim 44. The catalyst of Claim 43 wherein said promoter is a metal salt selected from the group consisting of rhenium (VII) oxide, ruthenium nitrosyl nitrate, platinum chloride, platinum ammine nitrate, platinum ammine chloride, and combinations thereof.

Claim 45. The catalyst of Claim 35 further including at least one promoter impregnated onto said catalyst particle after said particle is dried in step f), said promoter being impregnated onto said particle by dipping said particle in an aqueous solution of said promoter while maintaining agitation, and then separating said impregnated particles from said solution, and drying said impregnated particles.

Claim 46. The catalyst of Claim 35 wherein said support is aluminum oxide and said aqueous cobalt salt solution comprises water and hexaammine cobalt (II) carbonate.